freedom of form foundation

Newsletter for August 2022

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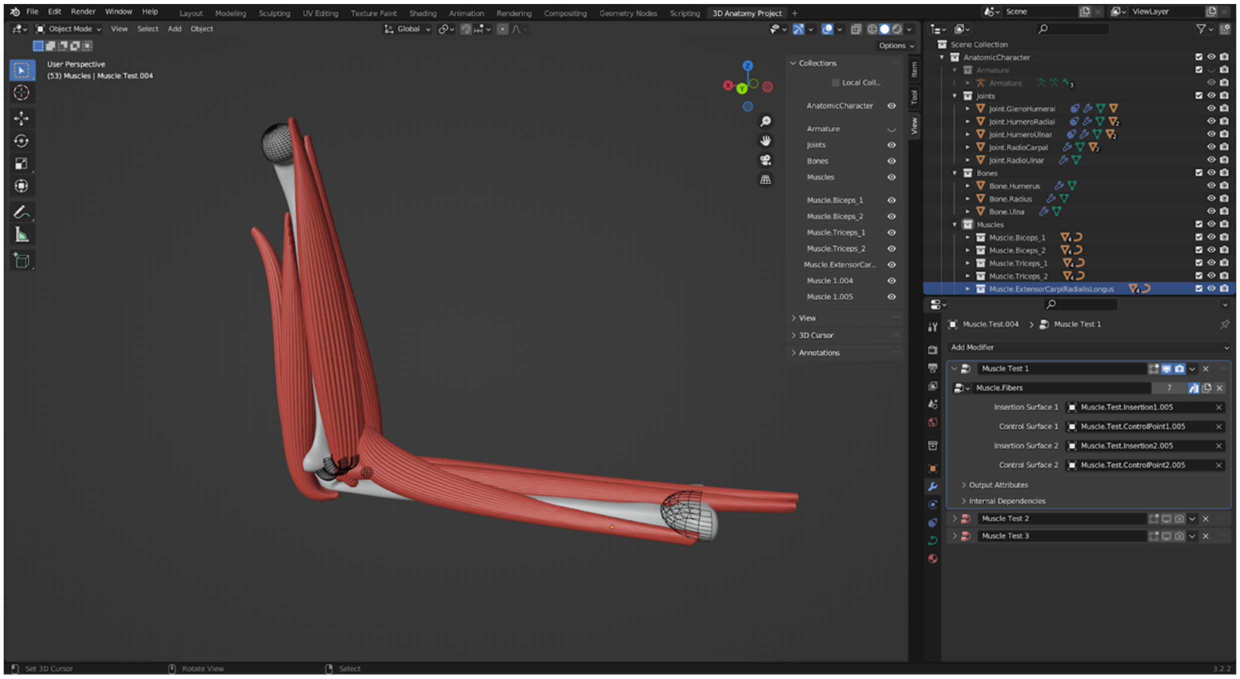
Anatomy Re-engineering Framework update

By Lathreas and Ellie | August 25, 2022

It’s time for another update on the Anatomy Re-engineering Framework! To briefly recap, our aim with this project is to create a tool that gives us and others the ability to redesign anatomy in a way that will be accurate enough to allow surgeons and geneticists to implement the changes without any trouble. In a sense, we want it to be easy for people to define a physically accurate “end goal” that can be relied on by engineers so that they in turn can create the technological solutions to perform said changes in real life. This is not just an artistic project; all physiological functions must remain preserved, and the patient must under no circumstance be at risk of harm. Since every transformation will be unique, it will be extra important that the tool is easy to use for engineers and artists while creating reliable results.

Our last update was in May of this year. In the past few months, we have continued to bring ARF closer to an initial release. As part of the journey, we discovered that the popular 3D modeling tool Blender has received a large update that partially implements a big part of the pipeline we have been working on, specifically Geometry Nodes. Although it might sound odd to consider an artistic program for something as technical as what we are attempting, a close analysis of many CAD tools ended up with Blender coming out on top for us! We would benefit heavily from not having to reinvent the wheel on many aspects of our intended modeling pipeline, which Blender already solves for us. At the same time, we can fit our program into the



Muscle.Test.004 > Muscle Test 1

Muscle Test 1

Muscle.Fibers 7

Insertion Surface 1: Muscle.Test.Insertion1.005

Control Surface 1: Muscle.Test.ControlPoint1.005

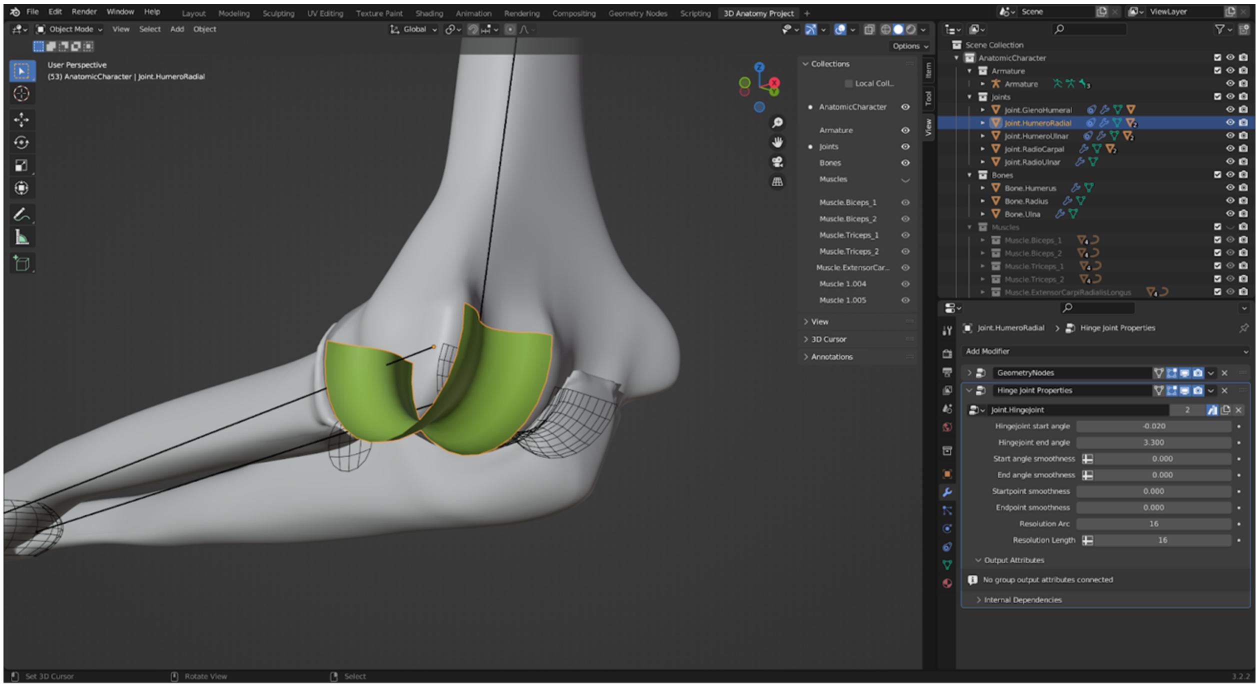
Insertion Surface 2: Muscle.Test.Insertion2.005

Control Surface 2: Muscle.Test.ControlPoint2.005

Muscle Test 2

Muscle Test 3

Our example bone now has joints (as explained in previous updates), as well as work-in-progress muscles consisting of individual muscle fibers. Although we haven’t added all muscles yet, after the recent additions to our system, this is as simple as a click of a button



Joint.HingeJoint 2

Hingejoint start angle -0.020

Hingejoint end angle 3.300

Start angle smoothness 0.000

End angle smoothness 0.000

Startpoint smoothness 0.000

Endpoint smoothness 0.000

Resolution Arc 16

Resolution Length 16

No group output attributes connected

The joint constraints can be shown as wireframes or as visual surfaces, and the parameters can be changed in the right-most panel

workflow many people are already used to, sitting side-by-side with other powerful plugins that may solve different tasks. We have decided to port our existing work over to Blender while retaining our physically accurate mathematical model.

The transition is coming along quite well, and we found it to be much easier to add new joint types and to change the user input in real-time, and we've found great performance improvements by utilizing Blender's optimized raytracing. We can benefit from the user interface as well, enabling us to focus only on what needs to be added or streamlined. The Blender implementation is now on par with and even further along than the original, with an experimental implementation of muscles underway.

One major feature is currently still under development, namely, the physical simulation that will ensure that muscles deform properly when a person moves, and so that they won't intersect each other and bones. Liz is working on this with incredible speed and is getting close to a Python implementation. We will leave the mathematical details for one of the big updates, but it's exciting stuff for sure!

To give an overview of the timeline, we are aiming first to handle bones, muscles, and skin, while leaving room and flexibility to add important anatomical details such as nerves and blood vessels for a later update. Once we are at such a stage, we can do a feature freeze and focus on polishing the program for a public release.

You can find our work as a set of .blend files on a new repository on Github: https://github.com/Freedom-of-Form-Foundation/anatomy3d-blender. Please note, though, that the program is still under active development, and therefore cannot be considered stable or usable yet beyond some simple testing. As our work progresses, we will shift our focus from features to user-friendliness and stability!

More details about this update on our website!

A growing team

By Zennith | August 28, 2022

Since January of this year, we've added *15* new volunteers to our organization. Throughout the year, we've added:

- 5 people to the still-relatively-new Gender Resources team,
- 2 people to the Integument team,
- 2 people to Outreach efforts,
- 1 to community and events,
- 2 to the Anatomy Re-engineering Framework project,
- 2 to the Enhanced Tail project (including 1 just last week!), and
- 1 for programming and database support (both administration and for the ARF project).

What's most exciting about this, to me, is the fact that most of our new people aren't just sticking around - they're diving in head-first. I'm always amazed by what's possible when uniting behind a mission we believe in.

It takes a lot of effort from both us and potential volunteers to see if there's a match. And by "match" I mean not just technical skill, but interests, motivation, personal bandwidth, and personality. But it's almost always a fun process. There's something about meeting someone new, who's interested in *teaming up* with you, that gets me really excited.

I hear the same from the project teams. For example, most recently the Enhanced Tail team was having a group interview with Nalco. Everyone was getting introduced to each other, and from what I hear, it was a blast - a great opportunity for nerding out.

It's not always smooth sailing. We've had a few new volunteers not work out - and to be clear that's not their fault. It's just an indication that finding and integrating talent into a growing organization is tricky. Some volunteers have turned out to be more limited in bandwidth than expected at first, or in some cases, major life events outside of their control have come up.

We're learning that there are some factors which tend to contribute to a volunteer's ability to hit the ground running. One of the biggest is - the more confidently that someone reaches out to us with the intent of volunteering, and the more excited they are by our mission, the more likely they are to become an exceptional team member.

There are exceptions in either direction of course, as with any rule - but we're continually learning more about how to cultivate the an environment that is exciting and rewarding to everyone.

Also, I have to say - meeting all of our new people on the way in has to be one of my favorite things to do. I'm tugged in a million directions and I can't always keep up with everyone, but it's seriously a privilege to meet so many new people. So, thank you!

Nix, Gender Resources lead and moderator

By Nix | August 26, 2022

Image by WafflesDoesArt

Hi, I'm Nix, and I'm the lead for the Gender Resources project! I have been publicly out and transitioning as a non-binary individual since 2017, and as a result, have had plenty of experience with navigating the often complicated waters of transgender healthcare. I've obtained a Bachelor's degree in Computer Information Systems and currently work as a SysAdmin/SRE in my day job. As an avid transhumanist and body-mod enthusiast, I am excited to see what the future holds for morphological freedom and the FFF.

Meet Mecknavorz, electronics and CS expert

By Mecknavorz | August 11, 2022

Image by AsarNurulla

My name Is Mecknavorz/T&R I graduated from UTD with a bachelors in computer science, since joining the enhanced tail project I've been able to increase the consistency of the muscle sensor code, lowering the discrepancy between samples and greatly increasing the sample rate to within medical standards for EMG technology. I've enjoyed the work I've gotten to do for the project so far and I'm very excited to continue helping out and seeing where this goes!!

Mac joins the Integument Review team

By Mac | August 12, 2022

Image by HypnosisWolf

Hello! My name is Mac, and I'm a researcher for the integumentary team! I currently am employed as a microbiologist and work with infectious disease, and currently working for a MPH; with my knowledge in human anatomy and infectious diseases, I look forward to applying this knowledge to research in learning more about the human anatomy and physiology. I enjoy playing games, company with friends and acquaintances, and music! I look forward to working more with the FFF and discovering the potential of the human body.